



*From the Author*

ON



# THE CAUSE OF THE RESPIRATORY MURMUR.

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VARIOUS causes have been, from time to time, assigned for the production of the respiratory murmur; and although, in a practical point of view, its exact seat and proximate cause may appear unimportant, provided we are familiar with the sound itself, and can rightly interpret the modifications of it which result from disease, yet it must be confessed that clear views of the physical phenomena of all healthy organic actions are very desirable; and just as our knowledge of the simple manner in which the sounds of the heart are produced has facilitated our diagnosis of cardiac diseases, so, more precise information than that we already possess, with regard to other points of a similar nature, cannot fail to be followed by beneficial results.

To the physical condition of the lung it is obvious that we must look for an explanation of the cause of the respiratory murmur; and there is one anatomical point, either unknown to those who have given their attention to this subject, or overlooked by them, which appears to me to offer a satisfactory solution of the phenomenon.

Without attempting to examine critically the opinions of others, I must content myself with observing that I believe the air-sacs of the lungs to be the seat of the murmur; and I shall now proceed to point out the arrangement which exists at the mouth of each air-sac, to which arrangement I am of opinion that the sound is due.

I have pointed out elsewhere<sup>1</sup> the manner in which each bronchial tube terminates in a series of air-sacs ; and the passage which has the most important bearing on the question of the cause of the respiratory murmur is the following :

“The air-sacs consist of somewhat elongated cavities, which communicate with a bronchial ramification by a circular opening, which is usually smaller than the cavity to which it leads, and has sometimes the appearance of a circular hole in a diaphragm, or as if it had been punched out of a membrane which had closed the entrance to the sac.”

This arrangement, which I have endeavoured to depict in the figures, is best seen in the lungs of children and of adults. In old age it has frequently disappeared, more or less. It may be often well seen in a piece of lung, the blood-vessels of which have been injected with coloured size, and which, after being dried, has been subsequently soaked in spirit. By careful dissection under a microscope the membrane, guarding the mouth of the sac, and narrowing the entrance to the cavity, is easily demonstrated. The membrane forms a part of the aërating walls of the air-sac, and has branches of the pulmonary artery ramifying in it.

It is obvious that a condition of this kind must have an influence on the passage of the air into the air-sac ; that, to a certain extent, it



Fig. 2.

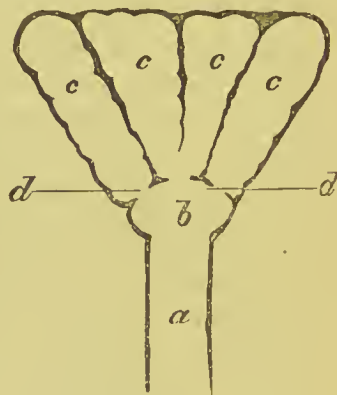


Fig. 1.

Fig. 1. Represents a terminal bronchial tube with a group of air-sacs ; *a*, terminal bronchial tube ; *b*, dilated extremity of the terminal bronchial tube forming the *point de réunion* of the air-sacs ; *c*, *c*, air-sacs ; *d*, *d*, mouths of air-sacs.

Fig. 2. Represents a single air-sac.

<sup>1</sup> The Anatomy of the Human Lung.

must produce an impediment to the current of air, and thus would give rise to a sound.

As the air is moved along the bronchial tubes it meets with no obstruction to its passage ; but at the commencement of the air-sacs an opening exists which is smaller than the cavities between which it is placed. As the air-sacs expand with each inspiration, air must pass through the constricted opening. I believe that, in the passage of the air through this opening, the main element of the respiratory murmur consists.

The following facts appear to me to afford arguments in favour of the view I have advanced : the respiratory murmur is loud and well marked in infancy and childhood ; it becomes modified in adult age, and in old age it is frequently very feeble. In the infant the membrane placed at the mouth of the air-sac is well marked and uninjured ; the opening in it has a clearly defined and sharp margin ; and, moreover, it is smaller—not only absolutely, but I believe also relatively—than in after life. In the adult, the air-sacs have undergone enlargement, and the membrane at their entrance is more or less perfect according as the lung is in a more or less healthy state ; whilst in old age, the membrane has often, to a great extent, disappeared, apparently as the result of the wasting and absorption which so frequently occur in the lungs of those advanced in life.

Further, the changes which take place in the character of the respiratory murmur in emphysema of the lungs afford an additional argument in support of this view. In this disease, in consequence of distension, rupture, and absorption, the air-sacs become much altered in character, and the membrane guarding the entrance to them entirely disappears as the disease progresses. The obstacle to the passage of air is therefore removed ; and hence one reason of the extremely feeble respiratory murmur which characterizes the affection.

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